

1 Description of the model. Field theoretic formulation

$$S_v(v', v) = v' D_v v' / 2 + v' \{-\nabla_t + \nu_0 \partial^2\} v + \omega_0 \nu_0^3 v'_i (\partial_i \theta) \partial^2 \theta \quad (1)$$

$$S(v, v', \theta, \theta') = S_v(v', v) + \theta' D_\theta \theta' / 2 + \theta' \{-\nabla_t + k_0 \partial^2\} \theta \quad (2)$$

Feynman rules.

$$\langle v, v' \rangle_0 = \langle v', v \rangle_0^T = (-i\omega + \nu_0 k^2)^{-1} \quad (3)$$

$$\langle v, v \rangle_0 = P_{ij} D_0 k^{4-d-y} | -i\omega + \nu_0 k^2 |^{-2} \quad (4)$$

$$\langle \theta, \theta' \rangle_0 = \langle \theta', \theta \rangle_0^T = (-i\omega + \nu_0 k^2)^{-1} \quad (5)$$

$$\langle \theta, \theta \rangle_0 = K_0 k^{2-d-y} | -i\omega + \nu_0 k^2 |^{-2} \quad (6)$$

$$\langle v'_i, \theta, \theta \rangle_0 = -i\omega_0 \nu_0^3 [p_i k^2 + p^2 k_i] \quad (7)$$

p, k - momentum of field θ .

$$\langle \theta', v_i, \theta \rangle_0 = -ip_i \quad (8)$$

p - momentum of field θ' , because $\partial_i v_i = 0$.

$$\langle v'_i, v_k, v_s \rangle_0 = -i[p_k \delta_{is} + p_s \delta_{ik}] \quad (9)$$

p - momentum of field v' .

2 Canonical dimensions, UV divergences and the renormalization

F	v	v'	θ	θ'	ν	ω, ω_0	D, D_0	k, k_0	g, g_0	u
d_F^k	-1	$d+1$	$-\frac{1}{2}z+1$	$d+\frac{1}{2}z-1$	-2	z	$y-6$	-2	y	0
d_F^ω	1	-1	$-\frac{1}{2}$	$\frac{1}{2}$	1	0	3	1	0	0
d_F	1	$d-1$	$-\frac{1}{2}z$	$d+\frac{1}{2}z$	0	z	y	0	y	0

The role of the coupling constants is played by the parameters $g_0 = D/\nu_0^3$, $u_0 = k_0/\nu_0$, and ω_0 . The model is logarithmic at $y = z = 0$.